Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application. Please amend claims 1, 3-28, and add new claim 29 as follows:

Listing of Claims:

1. (Currently Amended) A diagnostic ultrasonic imaging system comprising:

a scanhead having a plurality of transducer elements, each of the transducer elements having a transducer element terminal;

a ~~signal combiner~~ first multiplexer mounted in the scanhead having at least one first terminal and a plurality of second terminals coupled to respective ones of the transducer element terminals, the number of second terminals being substantially greater than the number of first terminals, the ~~signal combiner~~ first multiplexer being structured to selectively couple each of the second terminals to a first terminal~~combine signals from a plurality of the transducer elements into a lesser number of combined output signals~~;

a communications link coupled to ~~the signal combiner to receive each combined output signal~~each first terminal of the first multiplexer;

a ~~signal separator~~ second multiplexer having a plurality of third terminals and at least one fourth terminal coupled to a first terminal of the first multiplexer through the communications link, the number of third terminals being substantially greater than the number of fourth terminals, the second multiplexer being operable to selectively couple each of the third terminals to a fourth terminal ~~to receive each combined output signal, the signal separator being structured to separate each combined output signal into separate output signals corresponding to the signals combined to produce the combined output signal~~; and

an ultrasonic processor containing the second multiplexer, the ultrasonic processor including a plurality of receivers coupled to the third terminals of the second multiplexer so that receive signals output from the transducer elements are coupled to the receivers through the first multiplexer, communications link and second multiplexer, the ultrasonic processor further including a plurality of transmitters coupled to the third terminals of

the second multiplexer so that transmit signals output from the transmitters are coupled to the transducer elements through the second multiplexer, communications link and first multiplexer~~coupled to receive the separate output signals from the signal separator~~.

2. (Original) The diagnostic ultrasonic imaging system of claim 1 wherein the communications link comprises a wire.

3. (Currently Amended) The diagnostic ultrasonic imaging system of claim 1 wherein the ~~signal combiner~~ first and second multiplexers comprises ~~a~~ time-division multiplexers ~~and the signal separator comprises a time-division demultiplexer~~.

4. (Currently Amended) The diagnostic ultrasonic imaging system of claim 3 wherein the ~~time-division~~ first multiplexer ~~comprises:~~

~~a first multiplexer circuit having a first plurality of terminals and a second terminal coupled to the communications link, the terminals in the first plurality being coupled to the transducer element terminal of respective transducer elements, the first multiplexer circuit being~~ is responsive to a first digital control signal applied to a control input to couple the second terminals to ~~each of~~ the first terminals ~~in the first plurality~~ of the first multiplexer, and wherein the diagnostic ultrasound imaging system further comprises a first counter incrementing responsive to a clock signal received from the ultrasonic processor to generate a count to which the first digital control signal corresponds, the first counter being operable to apply the first digital control signal to the control input of the first multiplexer.

5. (Currently Amended) The diagnostic ultrasonic imaging system of claim 4 wherein the second multiplexer is~~time-division demultiplexer comprises:~~

~~a second multiplexer circuit having a first plurality of terminals coupled to the ultrasonic processor and a second terminal coupled to the communications link, the second multiplexer circuit being~~ responsive to a second digital control signal applied to a control input to couple each ~~the second~~ fourth terminal to ~~each of~~ the third terminals of the second

multiplexer~~in the first plurality; and~~, and wherein the diagnostic ultrasound imaging system further comprises a second counter incrementing responsive to ~~the~~ a clock signal received from the ultrasonic processor to generate a count to which the second digital control signal corresponds, the second counter being operable to apply the second digital control signal to the control input of the second multiplexer ~~circuit~~.

6. (Currently Amended) The diagnostic ultrasonic imaging system of claim 4 wherein the second multiplexer time~~-division demultiplexer~~ comprises:

an analog-to-digital converter having an input terminal coupled to the communications link and a plurality of digital output ports each coupled to one of the ~~ultrasonic processor~~receiviers and one of the transmitters, the analog-to-digital converter being responsive to the clock signal to convert a voltage level received from the communication link to a corresponding digital value and apply the digital value to the digital output ports.

7. (Currently Amended) The diagnostic ultrasonic imaging system of claim 3 wherein the ~~time-division~~ first multiplexer comprises:

a sample-and-hold circuit having a plurality of input terminals each of which is coupled to a respective transducer element, the sample-and-hold circuit being operable to retain a sample of a signal coupled from each of the transducer elements and to provide the samples on respective output terminals; and

a first multiplexer circuit having a first plurality of terminals and a second terminal, the terminals in the first plurality being coupled to respective output terminals of the sample-and-hold circuit, the first multiplexer being responsive to a first digital control signal applied to a control input to couple the second terminal to each of the terminals in the first plurality.

8. (Currently Amended) The diagnostic ultrasonic imaging system of claim 7 wherein the second multiplexer ~~time-division demultiplexer~~ comprises:

a second multiplexer circuit having a first plurality of terminals coupled to respective ones of the ~~ultrasonic processor~~ receivers and transmitters, and a second terminal coupled to the communications link, the second multiplexer circuit being responsive to a second digital control signal applied to a control input to couple the second terminal to each of the terminals in the first plurality.

9. (Currently Amended) The diagnostic ultrasonic imaging system of claim 7 wherein the second multiplexer ~~time-division demultiplexer~~ comprises an analog-to-digital converter having an input terminal coupled to the communications link and a plurality of digital output ports coupled to the respective ones of the receivers and transmitters ~~ultrasonic processor~~, the analog-to-digital converter being responsive to ~~the~~ a clock signal to convert a voltage level received from the communication link to a corresponding digital value and apply the digital value to the digital output port.

10. (Currently Amended) The diagnostic ultrasonic imaging system of claim 1 wherein the first multiplexer ~~signal combiner~~ comprises:

a plurality of first frequency-division multiplexers coupled to the transducer element terminals of respective transducer elements, each of the first frequency-division multiplexers generating a carrier signal modulated by an output signal from a respective transducer element, the modulated carrier signals from the first frequency-division multiplexers being in different frequency bands; and

a signal summer coupled to receive the modulated carrier signals from the first frequency-division multiplexers and apply a composite signal to the communications link.

11. (Currently Amended) The diagnostic ultrasonic imaging system of claim 10 wherein the second multiplexer ~~signal separator~~ comprises a plurality of second frequency-division ~~demultiplexers~~ multiplexers substantially corresponding in number to the number of first frequency-division multiplexers, the second frequency-division multiplexers each having an

input coupled to the communications link and an output coupled to a respective one of the ~~ultrasonic processor~~ receivers and a respective one of the transmitters.

12. (Currently Amended) The diagnostic ultrasonic imaging system of claim 11 wherein the first frequency-division multiplexers comprise respective amplitude modulators and wherein the second frequency-division multiplexers ~~demultiplexers~~ comprise respective amplitude demodulators.

13. (Currently Amended) The diagnostic ultrasonic imaging system of claim 11 wherein the first frequency-division multiplexers comprise respective frequency modulators and wherein the second frequency-division multiplexers ~~demultiplexers~~ comprise respective frequency demodulators.

14. (Currently Amended) A method of coupling receive signals from respective transducer elements in an ultrasonic scanhead to an ultrasonic processor and coupling transmit signals from an ultrasonic processor to respective transducer elements in the ultrasonic scanhead, the method comprising:

at the scanhead, combining the receive signals from a plurality of transducer elements into a composite receive signal;

coupling the composite receive signal from the scanhead to the ultrasonic processor; ~~and~~

at the ultrasonic processor, separating the composite receive signal into a plurality of components each of which corresponds to a receive signal from a respective transducer element;

at the ultrasonic processor, generating a plurality of transmit signals, and combining the transmit signals into a composite transmit signal;

coupling the composite transmit signal from the ultrasonic processor to the scanhead; and

at the scanhead, separating the composite transmit signal in to a plurality of transmit signals, and coupling each of the transmit signals to a respective one of the transducer elements.

15. (Currently Amended) The method of claim 14 wherein the acts of coupling the composite receive signal from the scanhead to the ultrasonic processor and the composite transmit signal from the ultrasonic processor to the scanhead comprises coupling the composite receive signal from the scanhead to the ultrasonic processor and the composite transmit signal from the ultrasonic processor to the scanhead through a wire.

16. (Currently Amended) The method of claim 14 wherein the acts of coupling the composite receive signal from the scanhead to the ultrasonic processor and the composite transmit signal from the ultrasonic processor to the scanhead comprises coupling the composite receive signal from the scanhead to the ultrasonic processor and the composite transmit signal from the ultrasonic processor to the scanhead through an optical communications link.

17. (Currently Amended) The method of claim 14 wherein the act of coupling the composite receive signal from the scanhead to the ultrasonic processor comprises coupling the composite signal from the scanhead to the ultrasonic processor through a radio communications link.

18. (Currently Amended) The method of claim 14 wherein the act of combining the receive signals from a plurality of transducer elements into a composite receive signal comprises time-division multiplexing the receive signals from the transducer elements, and wherein the act of separating the composite receive signal into a plurality of components comprises time-division ~~de~~multiplexing the composite receive signal.

19. (Currently Amended) The method of claim 18 wherein the act of time-division multiplexing the receive signals from the transducer elements comprises sequentially coupling the receive signals from each of the transducer elements to the ultrasonic processor.

20. (Currently Amended) The method of claim 18 wherein the act of time-division multiplexing the receive signals from the transducer elements comprises:

sampling the receive signals from the plurality of transducer elements;

combining the samples; and

coupling the samples from the scanhead to the ultrasonic processor.

21. (Currently Amended) The method of claim 20 wherein the act of sampling the receive signals from the plurality of transducer elements comprises sequentially sampling the receive signals from the plurality of transducer elements.

22. (Currently Amended) The method of claim 20 wherein the act of sampling the receive signals from the plurality of transducer elements comprises simultaneously sampling the receive signals from the plurality of transducer elements.

23. (Currently Amended) The method of claim 18 wherein the act of time-division ~~de~~multiplexing the composite receive signal comprises:

periodically determining the amplitude of the composite receive signal;

generating a digital value corresponding to each of the determined amplitudes; and

coupling each of the digital values to the ultrasonic processor through a respective terminal of the ultrasonic processor.

24. (Currently Amended) The method of claim 18 wherein the act of time-division multiplexing the receive signals from the transducer elements comprises sequentially coupling each of the transducer elements to a communications link to create the composite

receive signal, and wherein the act of time-division ~~de~~multiplexing the composite receive signal comprises sequentially coupling the communications link to each of a plurality of input terminals of the ultrasonic processor, the sequential coupling of the communications link to the input terminals being in synchronism with the coupling of the transducer elements to the communication link.

25. (Currently Amended) The method of claim 14 wherein the act of combining the receive signals from a plurality of transducer elements into a composite receive signal comprises frequency-division multiplexing the receive signals from the transducer elements to create the composite receive signal, and wherein the act of separating the composite receive signal into a plurality of components comprises frequency-division ~~de~~multiplexing the composite receive signal.

26. (Currently Amended) The method of claim 25 wherein the act of frequency-division multiplexing receive signals from a plurality of transducer elements comprises modulating carriers of different frequencies with each of the receive signals from the transducer elements, and wherein the act of frequency-division ~~de~~multiplexing the composite receive signal comprises ~~de~~modulating the composite receive signal to produce an output signal at each carrier frequency.

27. (Currently Amended) The method of claim 26 wherein the act of modulating carriers of different frequencies with each of the receive signals from the transducer elements comprises frequency modulating the carriers with respective output signals from the transducer elements, and wherein the act of demodulating the composite receive signal comprises frequency demodulating the composite receive signal.

28. (Currently Amended) The method of claim 26 wherein the act of modulating carriers of different frequencies with each of the receive signals from the transducer elements comprises amplitude modulating the carriers with respective output signals from the

transducer elements, and wherein the act of demodulating the composite receive signal comprises amplitude demodulating the composite receive signal.

29. (New) The method of claim 14 wherein the act of combining the transmit signals into a composite transmit signal comprises time-division multiplexing the transmit signals, and wherein the act of separating the composite transmit signal in to a plurality of transmit signals comprises time-division ~~de~~multiplexing the composite transmit signal.